

TYPE I PROGRESS REPORT FOR ERTS-I INVESTIGATION  
FOR THE PERIOD ENDING FEBRUARY 15, 1973

Submitted by Y.W. Isachsen, N.Y.S. Geological Survey,  
N.Y.S. Museum and Science Service

- a. Objective: To evaluate ERTS I data for usefulness as a geological sensor in the diverse geological terranes of New York State.
- b. GSFC ID S348, NAS 5-21764
- c. Problems: Unevenness in photographic film products for adjacent frames of the same orbit was documented in Type I report for period ending December 15th, and new film positives ordered. Details were given on attached Data Request Form. Newly exposed film products were received today but are yet to be evaluated for spectral-geological content.

d. Accomplishments:

1. More than 2200 film products have been catalogued and categorized in terms of geological usefulness as a function of cloud distribution. All useable film positives have been analyzed for geological content using white light, and some by color-additive viewing. The spectral geological data have been compiled on a map at 1:1,000,000, and the map is updated as new imagery arrives. Winter imagery, most of it heavily clouded, has failed to identify geological features beyond those detected in the summer and fall imagery. The major surficial geological features observed since the last report are tonally distinguished glacial lake sand deposits south of Plattsburgh and northeast of Black Lake.

2. A successful method was developed for pre-formatting the four 70 mm film positives of a given scene in preparation for color-additive viewing. The images are taped in perfect parallelism onto a 9.5 x 12 inch piece of 0.005 inch clear mylar. This eliminates the need for rotational registration of four separate images in the color-additive machine, resulting in an enormous saving of time and patience--especially where repeated viewing of a given scene is desired. It also greatly facilitates comparative viewing, although this is best accomplished using Kodacolor photographs of the color-additive projections.

3. Having extracted the more obvious spectral geological features from the standard ERTS-I black and white film positives of the Adirondack region, we decided to experiment with other methods in an attempt to accentuate the more subtle spectral features. Several methods are being employed as follows:

a. Diazo process: diazo color film transparencies were made of the ERTS frame covering the northwest Adirondacks as follows:

N73-18330

(E73-10298) TO EVALUATE ERTS-1 DATA FOR  
USEFULNESS AS A GEOLOGICAL SENSOR IN THE  
DIVERSE GEOLOGICAL TERRANES OF NEW YORK  
STATE (New York State Museum and  
Science Service) 6 p HC \$3.00 CSCL 08G

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band 4, yellow; band 5, magenta; band 6, red (and alternatively, orange); band 7, blue. Overlay composites failed to provide either new information or enhancement of existing data. We intend to view these diazo products next by color-additive projection methods.

b. Imagery of three representative scenes has been photographically reprocessed to produce high contrast negatives. These are being evaluated both in white-light and as Kodacolor enlargements of color-additive projections.

4. Spectral anomalies suspected to be of geological origin are being checked systematically, first by using existing maps, then airfoto index sheets at 1:62,500, and finally the NASA pre-launch U-2 test strip where it covers the anomaly in question. Several circular "anomalies" have been eliminated using the U-2 film products. About one-fourth of the anomalies have been evaluated to date.

e. Planned:

1. Continuing geological analysis and evaluation of ERTS imagery along the lines indicated under Accomplishments.

2. Continuing experimentation with photographic reprocessing of imagery for enhanced viewing using white-light and color-additive methods.

3. Continuing laboratory-library evaluation of spectral anomalies, to be followed by observation and photography from small aircraft as snow conditions warrant.

f. Publications and lectures:

Abstracts have been submitted to the Northeastern Section of the Geological Society of America, to Goddard (for the March 5-9 meeting), and to the American Society of Photogrammetry. The first two abstracts have already been submitted to Goddard, and the third is attached.

g. Recommendations:

None at this time.

h. A change in standing order to reduce cloud cover tolerance for 70 mm products from 80% to 20% was submitted to Goddard 7 Feb 73. A retrospective order for color transparencies was telephoned to Goddard 7 Feb 73.

- i. ERTS image description forms: Attached
- j. N.A.
- k. The content of this report falls under the subdisciplines 3M and 8E.

**SPECTRAL GEOLOGICAL CONTENT OF ERTS-I IMAGERY  
OVER A VARIETY OF GEOLOGICAL TERRANES IN NEW YORK STATE**

**Yngvar W. Isachsen**

**Geological Survey, New York State Museum  
and Science Service, Albany, New York**

ERTS-I imagery is being evaluated as a spectral geological mapping tool in the diverse geological terranes of New York State. The imagery is being analyzed, both as received from NASA and after photographic reprocessing, by conventional and color-additive viewing methods. Spectral features suspected to be of geological origin are screened using existing maps of many kinds, airfoto index mosaics, and U-2 photography where available. Remaining spectral anomalies are then evaluated by observation and photography from low-level aircraft and/or ground studies.

Bedrock features which can be identified to varying degrees include boundaries between major tectonic provinces, faults, topographic lineaments, lithological contacts, and large mining operations. The greatest amount of spectral geology is seen in crystalline terranes (Adirondacks and Hudson Highlands) where topography is strongly linked to bedrock geology.

Major applications being investigated include projection of geology from well-mapped into poorly mapped areas, and regional tectonic synthesis.

Submitted for presentation at the Amer. Soc. of Photogrammetry meeting at Sioux Falls the week of 29 Oct 73.

## ERTS IMAGE DESCRIPTOR FORM

(See Instructions on Back)

DATE 15 Feb 73PRINCIPAL INVESTIGATOR Y.W. IsachsenGSFC ST 348ORGANIZATION Geol. Survey, N.Y. State Museum & Science Service

NDPF USE ONLY

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ID \_\_\_\_\_

PRODUCT ID (INCLUDE BAND AND PRODUCT)	FREQUENTLY USED DESCRIPTORS*			DESCRIPTORS
1046-15290-5				Coast
1046-15292-5				Finger Lake.
1046-15295-5	✓			Airfield, Coast.
1059-15005-5				
1060-15065-5	✓	✓		
1060-15062-5	✓			
1115-15120-5	✓			
1115-15123-5				Excessive Cloud Cover
1116-15174-5	✓	✓		
1116-15181-5	✓	✓	✓	Snow
1116-15183-5	✓	✓	✓	Snow
1116-15190-5	✓	✓	✓	
1116-15192-5	✓	✓	✓	
1117-15233-5	✓	✓		
1117-15235-5	✓	✓		Snow
1117-15242-5				Barrier Bar, Snow
1117-15244-5				Snow
1117-15251-5	✓	✓	✓	
1131-15015-5				Excessive Cloud Cover
1131-15022-5				Excessive Cloud Cover
1132-15065-5	✓	✓		
1132-15071-5	✓	✓		Snow
1132-15074-5	✓	✓		Barrier Bar, Barrier
				Island, Coast, Snow
1132-15080-5	✓	✓		Barrier Bar, Barrier
				Island, Coast
1133-15121-5	✓	✓		Snow
1133-15123-5	✓			Snow
1133-15130-5				Snow
1133-15132-5	✓	✓		Coast, Snow
1133-15135-5	✓	✓	✓	Barrier Bar, Coast,
				Ridge
1134-15175-5	✓	✓		Snow
1135-15251-5				Excessive Cloud Cover

\*FOR DESCRIPTORS WHICH WILL OCCUR FREQUENTLY, WRITE THE DESCRIPTOR TERMS IN THESE COLUMN HEADING SPACES NOW AND USE A CHECK (✓) MARK IN THE APPROPRIATE PRODUCT ID LINES. (FOR OTHER DESCRIPTORS, WRITE THE TERM UNDER THE DESCRIPTORS COLUMN).

MAIL TO ERTS USER SERVICES  
 CODE 563  
 BLDG 23 ROOM E413  
 NASA GSFC  
 GREENBELT, MD. 20771  
 301-982-5406

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N \_\_\_\_\_

ID \_\_\_\_\_

PRODUCT ID (INCLUDE BAND AND PRODUCT)	FREQUENTLY USED DESCRIPTORS*			DESCRIPTORS
1137-15353-5				Snow
1137-15355-5				Snow
1137-15362-5				Excessive Cloud Cover
1149-15015-5				Coast
1149-15021-5				Excessive Cloud Cover
1153-15233-5				Excessive Cloud Cover
1153-15235-5				Excessive Cloud Cover
1153-15242-5				Snow, Finger Lake
1153-15244-5				Snow
1153-15251-5				Excessive Cloud Cover
1168-15063-5	✓	✓		Frozen Lake, Snow
1168-15065-5	✓	✓		Frozen Lake, Snow
1168-15072-5	✓	✓		Barrier Bar, Barrier
				Island, Coast, Snow
1168-15074-5				Barrier Bar, Barrier
				Island, Coast.

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